APPENDIX A
QUALITY ASSURANCE PLAN

CLERMONT COUNTY
WATER QUALITY MONITORING PROGRAM

CLERMONT COUNTY OFFICE OF ENVIRONMENTAL QUALITY
June 19, 2015

QUALITY ASSURANCE PLAN

CLERMONT COUNTY WATER QUALITY MONITORING PROGRAM

Revision 12
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3/6/2015
Hannah Lubbers, Project Manager — Date
Clermont County OEQ

4/2/15
Shannon Risner, Manager — Date
Clermont County Sewer Laboratory

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1.0 Quality Assurance Policy

The Clermont County Office of Environmental Quality (OEQ) has established and implemented this Quality Assurance Plan as one component of its annual Study Plan for the county's water quality sampling program. The purpose of the plan is to promote greater standardization for all facets of data collection and reporting in this program. Specific objectives of the plan are to establish detailed and documented procedures for the collection and reporting of all water quality data and to define criteria for the acceptance or rejection of data generated by these methods. Where applicable, control limits on the precision and accuracy of these methods will be established and only data that fall within these limits will be accepted without qualification.

2.0 Project Management – Organization and Responsibilities

2.1 Project Scope

The annual Study Plan for OEQ's water quality sampling program identifies the major tasks involved in the study, together with sub-tasks required for the completion of each major task. In addition, the Study Plan defines the methodology to be employed by the project staff in satisfying the defined objectives of the study. The study plan also identifies specific work products, including deliverable items such as reports and model outputs.

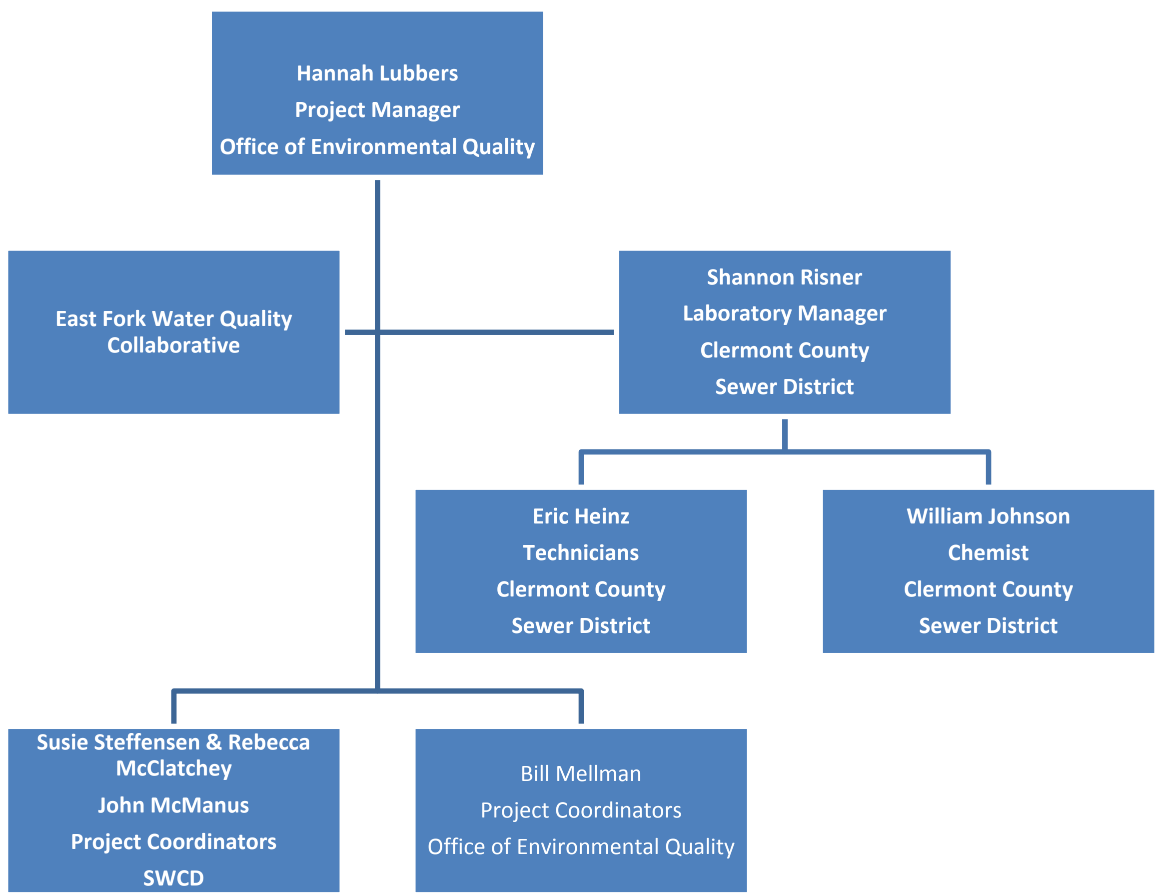
2.2 Project Organization

Each of the organizations included in the project team has established an organizational structure for providing technical direction and administrative control to accomplish quality-related activities for the development of the project.

The Clermont County Office of Environmental Quality (OEQ) has primary responsibility for managing the county's Water Quality Monitoring Program. OEQ is also responsible for the generation of the annual Study Plan, data review/assessment, and report generation. For 2011, Hannah Lubbers, OEQ will serve as project manager. Technicians from the Clermont Soil and Water Conservation District (SWCD) and the Clermont County wastewater laboratory will assist with the collection of all water quality samples and data entry. All technicians responsible for sample collection will be trained and supervised by a Level 3 QDC. Laboratory analysis of the samples collected by the technicians will be performed by the Clermont County Sewer District laboratory (the Sewer Lab), subject to this QA Plan, Pace Analytical, Columbus, OH subject to the QAP in Appendix D or MASI Environmental Laboratories, Cincinnati, OH to the QAP in Appendix E. Information provided to OEQ by each laboratory will be thoroughly reviewed for accuracy and thoroughness through data audits.

Figure 1 shows the organizational structure of the project team for the study. Ms. Hannah Lubbers of the OEQ is the Project Manager. Ms. Lubbers has been designated a Level 3 QDC for Chemical Water Quality Assessments by the Ohio EPA, effective Dec. 18, 2009. Ms. Susie Steffensen is the Project Coordinator and is responsible for coordinating sampling and serving as field technician. Mrs. Shannon Risner of the Clermont County Sewer District is responsible for the oversight of the laboratory analyses.

FIGURE 1: Project Team Organization



Staff members within each organization report to their team leader for technical and administrative direction. Each staff member has the responsibility for performance of assigned quality control duties in the course of accomplishing identified sub-tasks. The quality control duties include:

1. Completing the assigned task on or before schedule and in a quality manner in accordance with established procedures.
2. Ascertaining that the work performed is technically correct and meets all aspects of the QA Plan.

2.3 Position Descriptions

Hannah Lubbers, Project Manager, Clermont County Office of Environmental Quality
Ms. Lubbers has primary responsibility for developing and managing the county's Water Quality Monitoring Program for 2014. This involves soliciting input from the East Fork Water Quality Collaborative (born from the Scientific Advisory Committee) on projects to be included in each year's study, preparing/submitting a Study Plan consistent with OEPA guidelines, training and supervision of field personnel, coordination of field sampling and laboratory analyses, compilation and analysis of all collected data, and preparation of an annual Water Quality Report. She is also responsible for performing audits and reviewing all QC data generated by field and laboratory personnel and consultants.

Bill Mellman, Project Coordinator, Clermont County Office of Environmental Quality
Mr. Mellman will have responsibility for the collection of water quality samples and discharge data from the field operation. This will require an annual review of all operating manuals and SOPs, and all work will be performed under the supervision of Ms. Lubbers, a Level 3 Qualified Data Collector for Chemical Water Quality Assessments.

Susie Steffensen, Project Coordinator, Clermont Soil & Water Conservation District
Ms. Steffensen will have responsibility for the collection of water quality samples from the field operation. This will require an annual review of all operating manuals and SOPs, and all work will be performed under the supervision of Ms. Lubbers, a Level 3 Qualified Data Collector for Chemical Water Quality Assessments.

Rebecca McClatchey, Project Coordinator, Clermont Soil & Water Conservation District
Ms. McClatchey will have responsibility for the collection of water quality samples from the field. This will require an annual review of all operating manuals and SOPs, and all work will be performed under the supervision of Ms. Lubbers, a Level 3 Qualified Data Collector for Chemical Water Quality Assessments.

John McManus, Director, Clermont County Soil & Water Conservation District
Mr. McManus will have responsibility for the collection of water quality samples from the field operation. This will require an annual review of all operating manuals and SOPs, and all work will be performed under the supervision of Ms. Lubbers, a Level 3 Qualified Data Collector for Chemical Water Quality Assessments.

<u>Shannon Risner, Manager, Clermont County Sewer Laboratory</u>
Mrs. Risner is responsible for the day-to-day operations of the Clermont County Sewer Laboratory. In addition to performing a majority of the analyses required for NPDES compliance by the county's nine Publicly Owned Treatment Works (POTWs), the laboratory also performs the analyses for the county's Water Quality Monitoring Program. Mrs. Risner's responsibilities include sample scheduling, supervising laboratory personnel, ordering equipment and supplies, oversight of the laboratory's quality assurance and preventive maintenance programs, data analysis and reporting, and all other activities associated with the operation of the laboratory.

<u>Laboratory Technician & Chemist</u>
The Lab technicians and Chemist analyze and record data from wastewater treatment, collection systems, and surface water. They conduct chemical analysis on wastewater influent effluent samples as well as bio-solids. They also conduct tests, perform mathematical calculations, analyze data and determine compliance with regulatory standards. Other responsibilities include constructing and updating standard curves and analyzing standards, blanks, duplicate and spiked samples to ensure water quality control. They assist the lab in troubleshooting analysis problems and in establishing minimum detection limits. They also maintain QA/QC and are responsible for cleaning and maintaining laboratory equipment, instruments, and facilities.

Lab technicians are also responsible for collection of water quality samples from the field as well as equipment calibration and operation. They will also assist in data entry. This will require an annual review of all operating manuals and SOPs, and all work will be performed under the supervision of Ms. Lubbers, a Level 3 Qualified Data Collector for Chemical Water Quality Assessments. Figure 2 provides a position description for the Laboratory Technicians.

FIGURE 2. Position Description for Laboratory Technicians

Classification Title	Classification Number
WRD Laboratory Technician	69211

POSITION DESCRIPTION

Board of Clermont County Commissioners

Clermont County, Ohio

Agency / Department				Division	
Water Resources Department				Operations	
FLSA Status: Non-Exempt	Pay Range: 9	Bargaining Unit: No	Classified Position: Classified	Section or Shift: 1st (May be required to work other shifts or schedules.)	
Position Control Number (P.C.N.): N/A		Appointment Category: Full Time Permanent	Level of Autonomy: 5	P.C.N. / Title of Immediate Supervisor: WRD Laboratory Supervisor	
Workdays: Monday-Friday	From: 8:00 AM	To: 4:30 PM	Explain Unusual Shifts: Evenings/Weekends possible. Subject to Recall.	Emergency Level: 2	Probationary Period: 120 Days

Minimum Acceptable Worker Characteristics

Completion of high school education or GED certification. Completion of major core course work in chemistry (or 2 years chemistry experience). Knowledge of laboratory safety practices, chemical analysis, chemistry, laboratory practices and procedures. Ability to prepare meaningful, concise and accurate reports. Ability to understand and follow written or oral Instructions. Must have and maintain a valid drivers license. Must maintain position-specific certifications during employment if required. Must have computer skills: word processing, spreadsheets, windows. Duties are normally performed seated or standing and working at will. Job requires no more than normal physical abilities (i.e. vision and hearing acuity). Work is performed in a standard laboratory setting with adequate lighting, heating and ventilation or in the field. May need to negotiate rough terrain.

—or education, training and/or experience in an amount equal to the Minimum Qualifications stated above

Personal Development / Training Track

May Be Required to Demonstrate Proficiency by testing. "R" = Required Pre-Hire; "D" = Desired, may be available Post-Hire.

- Communications Skills-R
- Team Building Skills-R
- Computer Skills-R
- Microsoft Applications-R
- Defensive Driving-D
- App. OSHA Safety Regulations-R
- Good Lab Practices - R
- OEPA Class 1 Certification - D
- OEPA Lab Certification as required - D

Totals and Class Titles of Positions Directly Supervised	Signature	Date Signed
None	Signature - Human Resources Department Director: C. Sander	9-25-12
	Signature - County Administrator: [signature]	10/5/12

FIGURE 2 (Continued)

Classification Title	Classification Number
WRD Laboratory Technician	69211

%	Essential Job Functions and Responsibilities	Expected Outcomes
85	Operates a motor vehicle to sample, analyze, and record data from the water/wastewater treatment and distribution/collections systems, to ensure compliance. Representative duties include: Under minimal supervision performs wet chemical techniques and instrumental analysis on water, wastewater, watershed, and bio-solid samples to determine physical and chemical properties such as dissolved oxygen, suspended solids, ammonia, pH, CBOD, hardness, total solids, and phosphorus for compliance with all federal, state, and local regulations. Perform microbiological analysis of water and wastewater for fecal coliform and/or E coli bacteria. Prepare media and reagents for use in the Laboratory. Mathematical calculations and statistical analysis performed to determine minimum detection limits, geometric averages, and standard curves. Maintain QA/QC records according to EPA regulations and good laboratory practice. Assist wastewater treatment operators in troubleshooting operations to ensure compliance with NPDES permit limits. Develops and improves analytical methodology and procedures as the state of the art advances and regulatory demands are changed. Develops new process control for the laboratory as necessary.	Analyze water, wastewater, and bio-solid samples in accordance with all regulatory and safety requirements, servicing as a support function for the water/wastewater treatment and distribution/collections systems with the highest level of customer service. Ensure that all collection, testing, and performance standards are met or exceeded. All governing regulatory standards are met. Ensures expedient and accurate data entries.
10	Independent field operation including maintenance, calibration, and deployment of equipment for water quality and/or industrial sampling. Understand and apply Code of Federal Regulations to the collection, preservation, and analysis of samples. Maintaining quality assurance and control documentation, regular and timely reporting of data to Project/Laboratory Manager, keeping inventories of calibration and maintenance equipment. General knowledge of industrial regulations, stream geomorphology, and watershed characteristics.	Obtain representative samples of liquids and solids from locations throughout Clermont County using appropriate equipment, sample regulations, and safety procedures. All samples should comply with the reporting requirements of a Level 3 Laboratory.
5	Works alone or with other persons in short- or long-term team projects to resolve problems or conflicts in any area of county operations or to complete assigned projects at the direction of any county supervisor or Department Head when assigned. Participates in cross-training and maintains proficiency in area of cross-training as necessary. New and other related duties as assigned. Works aggressively to reduce or eliminate safety and risk concerns in work location. Reports safety and risk management issues to immediate supervisor.	Participates in team projects when assigned or as needed. Fully and completely cooperates with assigned additional duties and responsibilities. Maintains a positive attitude and contributes to a cooperative, professional and cheerful working environment in all team and/or training assignments.

Depart. Head Signature Approving Position Description	Signature - Immediate Supervisor After Review With Employee	Date Signed
[illegible] Bloom		
Date Signed by Department Head	**Signature - Employee Following Review With Supervisor**	**Date Signed**
9/25/12		

2.4 Training/Education/Experience

All of the technicians employed by the Clermont County Sewer Lab have the training, education and experience necessary to meet the qualifications identified in the job description (Figure 2).

2.5 Training Procedures

Method-specific training includes having technicians read the method SOP, observing the Lab Supervisor or a trained technician perform the method, then performing the method under direct supervision. Before being allowed to perform analyses without supervision, the technician must perform the analysis with <u>all</u> QC in control. Laboratory personnel are also encouraged to participate in off-site training and other opportunities for continuing education and career development.

2.6 Records on Employee Training and Performance

Records of employee training (in-house and off-site training) are included in the personnel records of all laboratory personnel. Performance objectives are developed by laboratory staff in consultation with the Laboratory Supervisor, and performance is evaluated relative to these objectives in semi-annual performance reviews. The lab also participates yearly in a required DMRQA program where it analyzes unknown samples. These results are kept on file.

3.0 Quality Assurance Objectives

The monitoring information that will be collected in support of the water quality sampling program will meet the quality assurance objectives outlined in this section. Data quality will be measured in terms of the data's accuracy and precision, completeness, representativeness, comparability, and the required detection limits for the analytical methods.

3.1 Accuracy

Accuracy is the measure of the agreement between an observed value and an accepted reference value or true value.

3.1.1 Laboratory Accuracy Objectives

Laboratory accuracy will be assessed through the analysis of matrix spikes and/or laboratory control samples to determine percent recoveries (%R). Table 1 provides a summary of the laboratory accuracy objectives. The % R utilizing matrix spikes is calculated as follows:

$$\%R = \frac{(C_S - C_U)}{C_A} \ x \ 100$$

where C_S = measured concentration of spiked sample
C_U = measured concentration of unspiked sample
C_A = actual concentration of spike added

The %R utilizing laboratory control samples is calculated as follows:

$$\%R = \frac{(C_M)}{(C_A)} \times 100$$

where C_M = measured concentration of control sample
C_A = actual concentration of control sample

Percent recovery values will be compared to individual value control charts for each analyte. These charts are derived from the laboratory's historical database, and plot the mean measurement value, as well as warning limits of mean $\pm$ 2 standard deviations (2 sigma) and control limits of mean $\pm$ 3 standard deviations (3 sigma). Sample values beyond the control range are deemed not acceptable and these samples are re-analyzed.

TABLE 1: Data Accuracy Objectives

Parameter	Analytical Accuracy			
	Estimated by	Objective	Estimated by	Objective
Temperature	N/A	N/A	N/A	N/A
pH	N/A	N/A	N/A	N/A
Dissolved Oxygen	N/A	N/A	N/A	N/A
Conductivity	N/A	N/A	N/A	N/A
$CBOD_5$	Controls	Acceptable Range Established By Supplier	Control Sample	$\pm$ 3 sigma
Total Phosphorus	Controls		Matrix Spike/Control Sample	$\pm$ 3 sigma
Orthophosphate	Controls		Matrix Spike/Control Sample	$\pm$ 3 sigma
Ammonia	Controls		Matrix Spike/Control Sample	$\pm$ 3 sigma
Nitrate	Controls		Matrix Spike/Control Sample	$\pm$ 3 sigma
Nitrite	Controls		Matrix Spike/Control Sample	$\pm$ 3 sigma
Suspended Solids	Controls		Control Samples	$\pm$ 3 sigma
Hardness	Controls		Matrix Spike	$\pm$ 3 sigma
E. coli	Controls		Control Samples	$\pm$ 3 sigma

3.1.2 Field Accuracy Objectives

Field accuracy will be assessed through the use of field, method and equipment blanks. In order for the accuracy assessment to be relevant, all appropriate protocols concerning sample collection, handling, preservation, and hold times must be maintained. A detailed discussion of these protocols is provided in the SOP documents.

For grab sampling, field blanks will be used to determine if samples collected have been contaminated. Field blanks consisting of reagent grade de-ionized water or distilled water will be submitted to the analytical laboratory to assess the quality of the data resulting from the field monitoring program. Field blanks will be analyzed to check for procedural contamination at the laboratory that may cause sample contamination.

Similarly, equipment that is used to collect samples for analysis may become contaminated through the normal course of monitoring. If not properly cleaned and rinsed, samples obtained subsequently may be contaminated from previous locations. Equipment and method blanks will be used to assess cross-contamination of samples by the equipment or method utilized.

3.2 Precision

Precision is a measure of the agreement between two or more measurements. Table 2 provides a summary of the data precision objectives for field and laboratory measurements.

TABLE 2: Data Precision Objectives

Parameter	Field Precision		Analytical Precision	
	Estimated by	Objective	Estimated by	Objective
Temperature	Readings	+/- 0.6° C		
pH	Readings	+/- 0.4 SU		
Dissolved Oxygen	Readings	10%		
Conductivity	Readings	10%		
$CBOD_5$	Field Duplicates	See 11.1.3.3		
Total Phosphorus	Field Duplicates	See 11.1.3.3	Lab Replicates	± 3 sigma
Orthophosphate	Field Duplicates	See 11.1.3.3	Lab Replicates	± 3 sigma
Ammonia	Field Duplicates	See 11.1.3.3	Lab Replicates	± 3 sigma
Nitrate	Field Duplicates	See 11.1.3.3	Lab Replicates	± 3 sigma
Nitrite	Field Duplicates	See 11.1.3.3	Lab Replicates	± 3 sigma
Suspended Solids	Field Duplicates	See 11.1.3.3	Lab Replicates	± 3 sigma
Hardness	Field Duplicates	See 11.1.3.3	Lab Replicates	± 3 sigma
E. coli	Field Duplicates	Within 5X parent sample	Lab Replicates	± 3 sigma

3.2.1 Field Precision Objectives

Field precision tests are conducted for grab samples and physical parameter readings. The precision of grab samples is assessed by the comparison of field duplicates.

3.2.1.1. Field Parameters:

The precision of physical parameter readings is assessed by the comparison of each instrument's calibration readings versus the post check readings. The relative percent difference (%RPD) between the readings will be calculated as follows:

$$\% RPD = \frac{|R_X - R_Y|}{0.5(R_X + R_Y)} \times 100$$

where R_X = calibration reading
R_Y = post check reading

3.2.1.2. Sample Parameters:

The %RPD between the analyte levels measured in the field duplicates will be calculated using the equation below (described in more detail in section 11.1.3.3.):

$$Y = [(0.9465x^{-0.344}) *100] +5$$

where

x = Sample/detection limit ratio
Y = acceptable %RPD

Thus a two-tiered system for duplicates is employed and the "Data Valid Tool" excel file can be used to validate duplicates . If the %RPD is below the values from the equation (*i.e*., below the curve), both data points are accepted as valid. If the %RPD exceeds the %RPD from the equation, both data points are rejected (level 2 or "R" qualified). At that point, particularly if multiple duplicate pairs have been rejected, the sampler(s) should look into possible causes for the disagreement and work to minimize those causes for future sampling.

3.2.2 Laboratory Precision Objectives

The precision of the laboratory analysis is assessed by analysis of laboratory replicates in order to calculate the %RPD as follows.

$$RPD = \frac{|C_A - C_B|}{0.5(C_A + C_B)} \times 100$$

where C_A = measured concentration of sample
C_B = measured concentration of replicate sample

In a manner similar to that uses to analyze % Recovery data for accuracy, RPD values will be compared to historical data using control charts. Unlike the control charts used to determine compliance with accuracy targets, a precision (or range) chart needs only the upper warning limits and upper control limits to be meaningful.

3.3 Completeness

Completeness is a measure of the amount of valid data obtained from the monitoring program compared to the amount of data that were expected. Events that may contribute to reduction in measurement completeness include sample container breakage, inaccessibility to proposed sampling locations, automatic sampler failure, and laboratory equipment failures.

The percent completeness (%C) is determined as follows:

$$\%C = \frac{(M_V)}{(M_P)} \times 100$$

where M_V = number of valid measurements
M_P = number of planned measurements

If the completeness objectives are not achieved for any particular category of data, the Project Manager will provide documentation why the objective was not met and how the lower percentage impacted the overall study objectives. If the objectives of the study are compromised, re-sampling or re-measurement may be necessary.

3.3.1 Field Completeness Objective

Field completeness is determined by the number of measurements collected versus the number of measurements planned for collection. The details concerning the actual number of field measurements and samples to be collected are discussed in the annual Study Plan. The number of measurements collected is validated by the Monitoring Leader. The completeness criterion for all measurements and sample collection is 90 percent, but will be influenced by environmental situations that may alter monitoring schedules.

3.3.2 Laboratory Completeness Objective

Laboratory completeness is a measure of the amount of valid measurements obtained from all samples submitted for each sampling activity. Each laboratory manager validates the numbers of valid measurements. The completeness criterion for all measurements is 95 percent.

3.4 Representativeness

Representativeness is the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representative data of dry weather and wet weather conditions are required to support the evaluation and modeling efforts.

For sample collection, representativeness will be assured by following the annual Study Plan and applying proper collection techniques (defined in the sample collection SOP) including the proper sample sizes and volumes, sampling times, and sampling locations. The volumes of the samples depend on the analytical methods and should allow for QC sample analysis and reanalysis, if required. In the laboratory, representativeness will be ensured by using the appropriate sample preparation techniques, by following appropriate analytical procedures, and by meeting the recommended sample holding times.

3.5 Comparability

The objective for data comparability is to generate data for each parameter that are comparable between sampling locations and comparable over time. Data comparability will be promoted by:

1. Using standard EPA approved methods, where possible
2. Consistently following the sampling methods detailed in the Study Plan and SOPs
3. Consistently following the analytical methods detailed in the QA Plan
4. Achieving the required detection limits detailed in the QA Plan

All sample collection and analytical methods will be specified, and any deviations from the methods will be documented. All results will be reported in the standard units shown in Table 3. All field and laboratory calibrations will be performed using ACS grade chemicals or other EPA approved sources.

3.6 Practical Quantification Limits

The practical quantification limits (PQL) and methodology for the study are provided in Table 3. The PQLs were set to meet project requirements and are based on the Project Team’s experience in analyzing samples similar to those being collected as part of this program. With the exception of nitrate, for all of the analytes specified in this study, the PQLs are at the current method detection limits for the laboratory. The rationale for this is discussed below (§ 3.6.1). The lab analyzes the PQL yearly and with any changes in the SOP.

TABLE 3: Practical Quantification Limits

Parameter	Analytical Method	Detection Limit
5-Day Carbonaceous Biological Oxygen Demand	5210 Standard Methods	2.0 mg/L
Total Phosphorus	365.2 EPA Method	0.026 mg/L
Orthophosphate	365.2 EPA Method	0.019 mg/L
Ammonia	4500-NH_3 Standard Method	0.1 mg/L
Nitrate	352.1 EPA Method	0.1 mg/L
Nitrite	4500 B Standard Methods	0.002 mg/L
Suspended Solids	2540 D Standard Methods	2.0 mg/L
Hardness	130.2 EPA Method	20 mg/L
E. coli	9223B-200 Standard Methods	10 c.f.u./L

Refer to Table 4 for the specification limits of the field measurement instruments and Table 5 for the sources of stream hydrology for the East Fork Little Miami River and area precipitation data.

3.6.1. Rationale for nitrate PQL

Due to frequent exceedance of the MDL, all nitrate data was used to calculate the concentration of the lowest standard as if it were a sample. The chart showed that the absorbance of the 0.1 mg/L standard consistently yielded a concentration close to 0.1 ppm (99% of the standard samples measured between 0.083 – 0.116 ppm).

TABLE 4: Specification Limits of Field Measurement Instruments

Parameter	Instrument	Range	Accuracy	Resolution
Temperature	YSI	-5 to 50^{o}C	$\pm$0.15 ^{o}C	0.01^{o}C
pH	YSI	0 to 14 units	$\pm$0.2 units	0.01 units
Dissolved Oxygen	YSI	0 to 20 mg/L	$\pm$0.2 mg/L	0.01 mg/L
Conductivity	YSI	0 to 100 mS/cm	$\pm$0.5% of range	4 digits

TABLE 5: East Fork Little Miami River Stream Hydrology and Precipitation Data

Parameter	Data Source	Data Type	Location
Stage	USGS	Gage Height (ft.) – Real Time	Perintown
	USGS	Gage Height (ft.) – Real Time	East Fork Dam
	USGS	Gage Height (ft.) – Real Time	East Fork Dam
	USGS	Gage Height (ft.) – Real Time	O’Bannon Creek
	Clermont County OEQ	Staff Gage (ft.), 15-min. intervals*	Shayler Run RM 1.7
	Clermont County OEQ	Staff Gage (ft.), 15-min. intervals*	Stonelick Creek RM 1.0
	Clermont County OEQ	Staff Gage (ft.), 15-min. intervals*	EFLM RM 34.8
	Clermont County OEQ	Staff Gage (ft.), 15-min. intervals*	Grassy Fork RM 0.2
Discharge	USGS	Discharge Volume (c.f.s.)	Perintown
	USGS	Discharge Volume (c.f.s.)	East Fork Dam
	USGS	Discharge Volume (c.f.s.)	East Fork Williamsburg (RM 34.8)
	USGS	Discharge Volume (c.f.s.)	O’Bannon Creek
Rainfall	USWS-Wilmington	Hourly & Storm Total Rainfall (in.)	SW Ohio
	Clermont County OEQ	Tipping Bucket (in.) 15 min. intervals	Shayler Run RM 1.7
	Clermont County OEQ	Tipping Bucket (in.) 15 min. intervals	Stonelick Creek RM 1.0
	Clermont County OEQ	Tipping Bucket (in.) 15 min. intervals	EFLM RM 34.8
	Clermont County OEQ	Tipping Bucket (in.) 15 min. intervals	CWLUS 6028 Marathon-Edenton Rd
	Clermont County OEQ	Tipping Bucket (in.) 15 min. intervals	Grassy Fork RM 0.2

*Staff Gage Measurement accuracy is 0.02 ft, based on minimum gage unit intervals

4.0 Laboratory Analytical Requirements

The following section details the aspects of the analytical requirements, ensuring that appropriate analytical methods are employed.

4.1 Analytical Methods

The laboratory will perform the following analytical methods in 2010:

Five-day carbonaceous biological oxygen demand will be analyzed using Standard Method 5210 from the 18th Edition of the *Standard Methods for Examination of Water and Wastewater.* Total Phosphorus and Orthophosphate will be analyzed using EPA Method 365.2 (All Forms Colorimetric, Ascorbic Acid, Single Reagent). This EPA method is referenced to Standard Method 4500-P E from the 18th Edition of the *Standard Methods for Examination of Water and Wastewater*. Ammonia will be analyzed using the Standard Method, 18th Edition, 4500-NH_3 F

(Potentiometric). Nitrate will be analyzed using EPA Method 352.1 (Colorimetric-Brucine). Nitrite will be analyzed using the Standard Method 4500 B (Spectrophotometric) from the 20th Edition of the *Standard Methods for Examination of Water and Wastewater*. Suspended Solids will be analyzed using Standard Methods 2540 D from the 18th Edition of the *Standard Methods for Examination of Water and Wastewater*. *E. coli* will be analyzed using the Standard Method, 22nd Edition, 9223 B (Colilert Methods). Hardness will be analyzed using the USEPA method 130.2 (Titrimetric, EDTA) .

4.2 Parameter Specific Information

Table 6 displays the required container type, preservation, and hold time for each parameter according to the previously referenced methods. The laboratory will provide clean sample containers. Table 7 displays the required container size for the parameter combinations.

TABLE 6: Parameter Specific Information

Parameter	Container	Preservation	Hold Time
5-Day Carbonaceous Biological Oxygen Demand	Polyethylene	Cool 4°C	48 Hours
Total Phosphorus	Polyethylene	Cool 4°C H_2SO_4 to pH < 2	28 Days
Orthophosphate	Polyethylene	Filter within 15 minutes Cool 4°C	48 Hours
Ammonia	Polyethylene	Cool 4°C H_2SO_4 to pH<2	28 Days
Nitrates	Polyethylene	Cool 4°C	48 Hours
Nitrites	Polyethylene	Cool 4°C	48 Hours
Suspended Solids	Polyethylene	Cool 4°C	7 Days
Hardness	Polyethylene	Cool 4°C HNO_3 TO pH < 2	8 Hours or 6 months after preservation
E coli	Polysulfone	Cool <10°C 0.00008% $NA_2S_2O_3$	8 Hours

TABLE 7: Parameter Combinations and Container Size

Parameter Combination	Container Size
ortho-P	250 mL
E. coli	110 mL
SS, NH3, NO_2, NO_3, Hardness, total-P	2 L

4.3 Analytical Methods Variances

The analytical methods used by the Clermont County Sewer District Laboratory are identical to the referenced methods in the Standard Operating Procedures.

5.0 Laboratory Equipment and Instrument List

A list of equipment for the Clermont County Sewer Lab is found in Attachment 1 of this document.

6.0 Sample Receipt and Chain of Custody Procedures

Whenever samples are collected, formal documented procedures for sample handling must be followed. The primary objective of these procedures is to create an accurate, written record which can be used to trace the possession and handling of the sample from the moment of its collection until it is analyzed.

6.1 Receiving samples

After sample collection, all samples are transported to the Sewer District Laboratory. The COC procedures described in section 6.5 are followed to ensure laboratory personnel are aware of sample arrival. The laboratory custodians will carefully check the contents for evidence of leakage and verify that samples were kept on ice. The laboratory will then verify that all information on the sample container label is correct and consistent with the chain-of-custody form. Any discrepancy between the sample bottle and the chain-of-custody form, any leaking sample containers, or any other abnormal situation will be documented by laboratory personnel on the chain-of-custody form. Laboratory personnel will discuss any problems with the person delivering the samples to the laboratory, and corrective actions will be discussed and implemented. If problems cannot be resolved at this level, they will be reported to the laboratory manager. The laboratory manager will inform the QA Officer of any such problem, and corrective actions will be discussed and implemented.

Further description of receiving procedures is included in Appendix B, in the SOP for Sample Handling.

6.2 Sample login

After the accuracy of the COC forms has been verified, laboratory personnel assign numbers to the samples. The number is written on the sample label and on both a white board and check-off form used for tracking samples.

6.3 Sample security

The Sewer District Laboratory is located at the Experimental Stream Facility. After business hours (7:00 a.m.-5:00 p.m.), all building entrances and the parking lot gate are locked to prevent trespassing or other offenses. During business hours the facility is always occupied by personnel and only one entrance can be accessed by visitors. Any visitors entering the building through this entrance pass by multiple offices and any unfamiliar visitors are confronted by personnel and escorted to their location if necessary.

6.4 Sample storage

Samples are stored according to the analytical methodology of each parameter to be analyzed. Sample storage is specific to each parameter and storage locations and analytical methodologies are described in the Laboratory Standard Operating Procedures in Appendix B.

6.5 Sample tracking

When a sample is collected in the field, information regarding the sample (sample I.D., sample location, time/date, parameters to be analyzed, etc.) is recorded on a chain-of-custody form (Appendix C, Stream Sampling SOP, Attachment 3). Each time custody of a sample or group of samples is transferred, the person relinquishing custody of the sample(s) must sign, date, and record the military time on the chain-of-custody form. The person receiving custody of the sample(s) must also sign, date, and record the military time on the chain-of-custody form. Both persons should keep a copy of the form. Use of the chain-of-custody form will terminate when laboratory personnel receive the samples and sign the form.

Samples going out to contract labs are collected at the Wastewater Lab, were lab staff sign off on the samples on the COC forms. The lab staff then fill out a COC for the contract lab and place the COC in the outgoing bin in the sample receiving area. Samples going to contract labs are stored according to the requirements outlined in the applicable SOP.

After the accuracy of the COC forms has been verified and samples are in the possession of laboratory personnel, numbers are assigned to the samples. The number is written on the sample label and on both a white board and check-off sheet (Appendix B, Sample Handling SOP, Attachment 1) used for tracking samples. Analyses are checked off both the white board and check-off sheet after the completion of each test. For the analyses where samples are batch analyzed (nitrate, total kjeldahl nitrogen, total phosphorus, and sometimes nitrite and ortho-phosphorus), the lab technician saving the sample for batch analysis will mark an “s” in the appropriate analysis box & note the date box for that test. Once the batched tests are completed, the analyst completing the test will check off the appropriate analysis box. Further details for sampling tracking are included in the Sample Handling SOP located in Appendix B.

6.6 Sample disposal

At the end of the day, after the Laboratory Manager determines which samples have been completely analyzed for all parameters, samples are discarded. Further description of sample disposal is included in Appendix B, in the SOP for Sample Handling.

7.0 Laboratory Standard Operating Procedures

See Appendix B for Standard Operating Procedures for chemical analyses being conducted by the Sewer District Laboratory.

8.0 Calibration Procedures

Calibration procedures follow manufacturer’s specifications and are described in method-specific standard operating procedures (see Appendix C for field methods and Appendix B for laboratory methods).

9.0 Preventative Maintenance and Documentation

The standard lab glassware is inspected for damage during use and after cleaning. It is discarded and replaced as needed.

The dishwasher is repaired as needed. The lab personnel hand wash sample bottles and glassware as needed, and as a backup for the dishwasher.

The analytical balance is cleaned weekly and as needed. It is cleaned and serviced yearly by an outside specialist. The lab analyst using it performs a daily internal calibration as well as checking a separate Class S weight. Any problems that cannot be fixed by lab personnel result in service as needed.

The water bath is cleaned as needed. The water is replaced as needed with fresh de-ionized water.

The refrigerators are cleaned and serviced as needed. Each one has its temperature checked daily.

The vacuum pumps are cleaned and serviced as needed.

The spectrophotometer is cleaned and serviced as needed. The peristaltic pump tubing is replaced as needed.

All repairs and services are documented. Daily checks are recorded. The lab does not document cleaning.

10.0 Internal Quality Control Checks

Internal quality control checks are performed to ensure that the field and laboratory generated measurements meet the project quality assurance objectives. In addition, the quality control checks are intended to identify any need for corrective action.

10.1 Field Measurements

Field quality control checks will consist of QA samples that will be collected or prepared by the field crews to be submitted for laboratory analysis. These samples will consist of duplicates, field blanks, method blanks, and equipment blanks. The acceptable control limits are discussed in Section 3.0. Upon receipt of the data from the monitored event, the Project Manager will assess the adequacy of the quality control checks and identify any problems.

In addition, quality control checks will be conducted on a daily basis for the multi-parameter meters. The checks will involve the review of the calibration sheets for the YSI sondes. Any problems with sensors will be addressed immediately. The result of each review will be recorded on the instrument's calibration sheet. At the conclusion of each sampling round, all calibration sheets will be reviewed by the Project Manager and Project Coordinator to assess the adequacy of the quality control checks and to review the instrument's performance to identify any problems.

The Project Coordinator will inform the Project Manager of any quality control check issues and discuss corrective actions. All quality control documents will be contained within a file for each monitored event.

10.2 Laboratory Measurements

The Sewer Lab will perform quality control checks on all sample analyses. These will include replicates, matrix spikes, matrix spike duplicates, control samples, and method blanks as appropriate. Quality control procedures for analytical services will be conducted by the Sewer Lab in accordance with their standard operation procedures and the individual method requirements referenced by U.S. EPA or Standard Methods. The acceptable control limits are discussed in Section 3.0 and data validation procedures are discussed in Section 11. The laboratory manager will inform the Project Coordinator immediately of any quality control check issues and to discuss corrective actions, which are outlined in Section 12. Table 8 summarizes the laboratory quality control check frequencies.

TABLE 8: Laboratory Quality Control Check Frequencies

Parameter	Batch Size	QC Check	Frequency
5-Day Carbonaceous Biological Oxygen Demand	N/A	Control Sample	Every day's test
Total Phosphorus	8 to 33	Control Sample	Every Analysis Batch
		Duplicate	
		Matrix Spike	
Orthophosphate	2 to 33	Control Sample	Every Analysis Batch
		Duplicate	
		Matrix Spike	
Ammonia	2 to 33	Control Sample	Every Analysis Batch
		Duplicate	
		Matrix Spike	
Nitrate	2 to 33	Control Sample	Every Analysis Batch
		Duplicate	
		Matrix Spike	
Nitrite	2 to 33	Control Sample	Every Analysis Batch
		Duplicate	
		Matrix Spike	
Suspended Solids	2 to 33	Blank	Every day's test
Hardness	1 to 10	Matrix Spike	Every Analysis Batch
		Duplicate	
		Blank	
E. coli	2 to 33	Negative	Monthly or every new reagent lot
		Blank	Every day's test
		Positive	Monthly or every new reagent lot

With the exception of orthophosphate, hardness and $CBOD_5$, OEQ samples are routinely analyzed in batches that may also include NPDES samples from the Clermont County Sewer District's various wastewater treatment plants. Orthophosphate analyses are limited to OEQ samples only.

11.0 Data Review, Validation, Reporting, and Assessment

All environmental measurement data collected by project staff will be subjected to quality control checks before being utilized in the interpretive reporting. All data generated through field activities or by laboratory operations will be reviewed and validated prior to assessment.

11.1 Data Review

The Project Manager will perform data reviews that will consist of screening the field data sheets and laboratory data according to established criteria. Screening criteria will be designated for each review type. If the established screening criteria are violated, an additional review of the quality control checks and any relevant laboratory bench sheets will be conducted. The investigation of the issue will be documented and the data will be discarded or flagged appropriately, identifying the limitations of the data.

11.1.1 Field Data Sheet Reviews

The following criteria will be used to screen the physical parameter measurements recorded by the field crews.

1. Temperature readings – do values seem reasonable
2. pH readings – do values seem reasonable
3. Dissolved oxygen readings – do concentrations compare to percent saturation
4. Conductivity readings – do concentrations seem reasonable

Reasonable values are considered within two standard deviations from the mean of historical OEQ surface water data. Values outside of two standard deviations from the mean but within three standard deviations from the mean will be scrutinized by looking at other field data and observations to see if there is a logical source of high or low values. If there is no logical source of abnormal readings or the readings are outside of three standard deviations from the mean, readings will be discarded and a second visit to the field site with properly functioning equipment may be necessary to get accurate field readings.

11.1.2 Laboratory Data Sheet Reviews

The following criteria will be used to screen the analytical measurements performed by the laboratory.

1. Equipment blanks – are values less than detection limits
2. Field blanks – are values less than detection limits
3. Review of all values – do concentrations/densities seem reasonable
4. Total phosphorus / orthophosphate ratios – TP greater than or equal to OP
5. Nitrogen as Nitrate/ nitrogen as nitrite ratios – nitrate greater than or equal to nitrite

The laboratory manager will inform the QA Officer immediately of any exceedances of the minimum detection limit for blanks and to discuss corrective actions.
Data will be flagged if the QA is violated. Further corrective action may be required and this procedure is described in Section 12.

11.1.3 Data Validation

All environmental measurement data and samples collected by project staff will be subjected to quality control prior to being entered into databases. The following must be checked as part of the measurement/analytical data validation activities.

1. Field measurements data collection
2. Field sample collection
3. Sample chain of custody
4. Laboratory analytical results
5. Data reviews
6. Quality control data

The Project Manager will conduct periodic reviews of the data for compliance with the established quality control criteria based on duplicate, replicate, spiked, control, and blank data results provided by the laboratory. In addition, quality assurance evaluations of data accuracy, precision, and completeness will be performed on the field measurement data and the laboratory analytical results for each monitored event.

If quality control checks or objectives were not met, an investigation of the nonconformance will be initiated. The nonconformance will be documented and the data set affected will be flagged appropriately, identifying any limitations.

11.1.3.1 Field Blanks

If the values are greater than ten times the blank value, the data from that batch will not be qualified. If values collected from a batch are five to ten times greater than the value of the blank level or duplicate precision objectives are not met, the data will be flagged as an estimate (J qualified). If values are less than five times the blank value from that batch, the values will be flagged as level 2 data, which is used for trend evaluation only. If values are less than 3 times the blank value, the data should be rejected.

11.1.3.2 Hold Time

If an analysis hold time is exceeded, data will be qualified as J- if there are positive results, and non-detects will be qualified as UJ.

11.1.3.3.Duplicate Samples

For bacteria samples (E. coli), a duplicate sample must be within the multiple of five times of the parent sample.

For the remaining constituents, a higher percent relative difference (%RPD) is allowed at lower concentrations, since there is a greater percent uncertainty closer to the detection level; and a lower %RPD is allowed at higher concentrations, since analytical results should be more consistent at higher concentrations. To account for this varying acceptable %RPD, duplicate samples are analyzed using a curved line. An equation to a line was developed using the ratio of the sample concentration to the detection limit and the acceptable %RPD value. The three points used are:

- (1, 1.0) – At the detection limit, approximately 100% RPD is acceptable
- (5, 0.5) – at 5x the detection limit (often near the RL), approximately 50% RPD is acceptable
- (100, 0.2) – at 100x the detection limit, approximately 20% RPD is acceptable

The resultant equation is $Y = [(0.9465x^{-0.344}) *100] +5$
where x = Sample/DL ratio and y = acceptable %RPD

Thus a two-tiered system for duplicates is employed and the "Data Valid Tool" excel file can be used to validate duplicates . If the %RPD is below the values from the equation (*i.e*., below the curve), both data points are accpeted as valid. If the %RPD exceeds the %RPD from the equation, both data points are rejected (level 2 or "R" qualified). At that point, particularly if multiple duplicate pairs have been rejected, the sampler(s) should look into possible causes for the disagreement and work to minimize those causes for future sampling.

11.1.3.4 Paired Samples

Some parameters are fractions or subsets of others, such as nitrate being part of nitrate/nitrite, so that the one parameter should, in theory, never have a higher concentration than the other parameter. Examples of paired parameters are below:

- TOC ≥ DOC
- Nitrate/Nitrite ≥ Nitrate
- Total P ≥ orthophosphate (or dissolved reactive phosphorus)
- Total Cr ≥ Hexavalent Cr
- TKN ≥ Ammonia
- BOD ≥ Dissolved BOD (or other dissolved parameter pairings)

It's theoretically possible that the subset analyte could be 100% of the total (or larger) analyte, but any result where that compound exceeds the total (or larger compound) should be considered an estimated concentration (qualified with a "J"). Results that are quite close may be essentially the same number and valid for most data uses. Similar to how duplicate samples are evaluated above, the same equation to determine the acceptable %RPD will be used for "Paired Parameters" analytical results within the same sample.The "Data Valid Tool" exel file can also be used to validate paired samples.

For "Paired Parameters" with a %RPD less than the equation amount (using an average Detection Limit this time, since they may be different), the data should be "J" qualified, leaving both data points as useable for most applications. However when the %RPD exceeds the amount from the equation, the two data points should be rejected as level 2 data. This all applies only when the subset parameter has a higher concentration than the expected larger/parent parameter. If the subset parameter has a lower or equal concentration, then no evaluation/qualifiers are needed.

11.2.1 Field Activities Data Validation

Individual crew leaders will verify the completion of their field data sheets and chain-of-custody forms. In addition, crew leaders will also verify the proper calibration and operation of their multi-parameter instruments. At the completion of each sampling round, the Monitoring Leader will review all field data sheets, calibration sheets, and chain-of-custody forms for accuracy and completeness. The Monitoring Leader will also verify that monitoring QA objectives for all accuracy, precision, completeness, and adherence to the required collection techniques are being met.

11.2.2 Laboratory Analytical Results Validation

Individual analysts will verify the completion of the appropriate analytical test and required bench sheets. The laboratory managers or designees will review calculations and inspect laboratory bench sheets and log books regularly to verify their accuracy, completeness, and adherence to the specified analytical method protocols. Calibration and QC data will be examined daily by the individual analyst. The laboratory managers or designees will verify that all instrument systems are under control and that QA objectives for accuracy, precision, completeness, and adherence to the required detection limits are being met. The laboratory managers or designees verify that the data entered in the temporary database matches the data on the bench sheet. Any differences are corrected before the data is posted into the monitoring database. Any nonconformance issues will be addressed by the laboratory manager and brought to the attention of the Project Manager.

11.3 Reporting

Data generated through field and laboratory activities will be used for developing models and reports. Reporting formats will vary depending on the purpose for which the data have been assembled.

11.3.1 Field Reporting

Field data reporting shall be conducted principally through the transmission of data sheets containing tabulated results of all measurements taken in the field, and documentation of all field calibration activities.

11.3.2 Laboratory Reporting

The reporting of laboratory data will begin after the laboratory manager or designee has concluded the validation review. The laboratory will enter validated data into the laboratory's monitoring database, where it can be accessed by the Project Manager. QC data for each parameter by batch will be made available to the Project Manager as necessary in order to conduct the systematic reviews described in Section 6.2.0

11.4 Assessment

Once all field measurements and analytical data have been reviewed, quality control measures assessed, and any problems addressed, the measurement and analytical data will be assessed. The assessment of the information generated from the monitoring program will be initiated by entering all analytical data and field measurement data into the project database (Ecological Data Application System, or EDAS). In addition, precipitation, stream hydrology data, field notes, and information on any sampling anomalies will be appended. All of this data will be evaluated and any relationships or correlations will be noted. Ultimately this data will be prepared for input into the source and water quality models.

12.0 Corrective Action

Corrective actions will be implemented as required to rectify problems identified during the course of normal field and laboratory operations. Possible problems requiring corrective action include:

1. Equipment malfunctions,
2. Analytical methodology errors, and
3. Non-compliance with quality control systems

Equipment and analytical problems that require corrective action may occur during sampling and sample handling, sample preparation, and laboratory analysis.

For non-compliance problems, steps for corrective action will be developed and implemented at the time the problem is identified. The individual who identifies the problem is responsible for notifying the appropriate people of the problem immediately.

Any nonconformance with the established quality control procedures outlined in the QA Plan or annual Study Plan will be identified and corrected.

12.1 Field Measurements and Sample Collection

Project staff will be responsible for reporting any suspected QA nonconformance or deficiencies to the Project Manager. The Project Manager will be responsible for assessing the suspected problems, review the sampling protocols and provide additional training if necessary. If it is determined that the situation warrants a corrective action, then a Corrective Action Memorandum will be issued by the Project Manager.

The Project Manager will be responsible for ensuring that the corrective action for nonconformance takes place by:

1. Evaluating all reported incidences of nonconformance,
2. Controlling additional work on nonconforming items,
3. Determining what corrective action is needed,
4. Maintaining a log of nonconformance issues,
5. Reviewing responses to corrective action memoranda, and
6. Ensuring that copies of corrective action memoranda and responses are included in the project files.

No additional work will be performed until appropriate corrective action has been implemented and documented in response to the corrective action memoranda.

12.2 Laboratory Analyses

Corrective actions are required whenever laboratory conditions, instrument malfunction or personnel situations have led or could potentially lead to errors in the analytical data. The corrective action taken will be dependent on the analysis and the event.

Laboratory personnel are alerted that corrective actions may be necessary if:

1. QC data are outside the acceptable range for precision and accuracy as identified in Section 3,
2. Blanks contain target analyses above acceptable levels,
3. Undesirable trends are detected in spike recoveries or RPD between duplicates,
4. Excessive interference is noted, or
5. Deficiencies are detected by the staff during laboratory system audits as described in Section 13.2.

Corrective action procedures are often handled at the bench level by the analyst, who reviews the preparation or extraction procedure for possible errors, checks the instrument calibration, spike and calibration mixes, instrument sensitivity, and etc. Control charts are used to monitor check standards, sample spike recovery, sample duplicate range and the linearity of standard curves. These charts are updated in the database after each analysis. QC data points outside the Control Limits (3 standard deviations fail); if the value does not change with rereading the sample, then that QC fails. The analysis is then redone. A point inside the Control Limits, but outside the Warning Limits (2 standard deviations) occasions the analyst to examine one's technique.

Corrective action taken within the laboratory is the responsibility of the laboratory manager who informs the Project Manager when a problem occurs and of the steps taken to resolve it. Once resolved, full documentation of the corrective action procedure will be filed with the Project Manager. No data will be entered into the laboratory's monitoring database from analyses that have failed any QC limit. If the QC fails, the analyst would reread the samples or standards to ensure the existence of the error. Samples will be re-analyzed as needed once corrective actions have been taken to assure that all data entering the database is of acceptable quality.

13.0 System Audits

All team members are committed to providing quality services. The primary responsibility for the quality of work products rests with the individuals doing the work and with their immediate supervisors.

For certain project components, a technical reviewer will audit the study products. The technical reviewer will perform a critical, written evaluation of the work product, and the technical audit will be incorporated in the project record.

The Project Manager is responsible for identifying the work products to be audited and the scope of the audit, for scheduling technical audits, for assigning competent, qualified technical auditors, and for making sure that appropriate follow-up actions are taken to correct reported deficiencies.

13.1 Field System Audits

Field system audits will be completed each year to ensure that the actual field procedures conform to those documented in the annual Study Plan and associated SOPs. The QA Officer will perform the field system audits. The audit will include a check of all field records and a review of all activities to document if procedures were conducted in compliance with the specified documentation.

13.2 Laboratory System Audits

A Laboratory Performance Audit Inspection (PAI) of the Sewer District Laboratory has been performed by the Ohio EPA Division of Environmental Service on April 21, 2009. The PAI provided accreditation for the Sewer District Laboratory, as required in OAC 3745-4-06 (B) (3) in order to perform analyses under a Level 3 Study Plan. The laboratory also participates in the Discharge Monitoring Report – Quality Assurance (DMR-QA) study each year as a requirement of the National Pollutant Discharge Elimination System (NPDES) program. DMR-QA evaluates the analytical and reporting ability of the laboratories that routinely perform inorganic chemistry and whole-effluent toxicity self-monitoring analyses required by NPDES permits. Participation in this program, including proper analyses, reporting, and record retention is mandatory based on the authority of Section 308(a) of the Clean Water Act. Failure to report study results could lead to an investigation and possible enforcement action. All proficiency test samples are supplied by vendors accredited by the National Institute of Standards and Technology (NIST) or the National Environmental Laboratory Accreditor Conference (NELAC).

14.0 Reports to Management

The project team personnel provide independent reporting to the Project Manager on an as needed basis. This communication is facilitated through the use of electronic mail which provides ready access. In addition, the team leaders will provide written reports to the Project Manager on quality assurance issues as described in the QA Plan.

Field and laboratory system audits will be performed as described in Section 13.0 and the results will be provided to the Project Manager. The results of all audits will be summarized in written reports, with copies retained in the Project Files. The audit reports will be competed for field and laboratory system audits according to the general outline described below.

All audit reports will include the following sections:

1. Introduction – provides background of the project, laboratory, or program element, description of personnel and affiliation of all staff involved, the name of the auditor, the time and date of the audit, and a description of the activities audited.
2. Audit Findings – describes the results of the audit including a deficiency report identifying all instances where the procedures in the annual Study Plan, QA Plan, or laboratory QAP were not being followed.
3. Conclusions – summarizes the results of the audit and includes recommended actions to address any noted deficiencies.

15.0 Document Retention and Control

The analytical data results, along with any additional narrative documentation will be submitted by the Sewer Lab to OEQ in either an electronic format or in hard copy within a specified time frame from the completion of each survey. The Sewer Lab will maintain copies of all bench sheets generated during the processing of these samples, but will provide copies to OEQ upon request.

The Project Manager is responsible for establishing project files and for overseeing maintenance of the files during the course of the project. All project files will be properly identified by client, project name, project number, file description, and file number for all appropriate correspondence, memoranda, calculations, technical work products, and other project-related data. In addition, a quality assurance file will be maintained containing all QA related information. Computer files containing important project information are backed up every evening by the Clermont County Information Services Department.

The Laboratory follows a records retention schedule which specifies that files are sent to the Clermont County Records Center at the end of each year. After which, they are

15.1 Procedures for Procurement and Process Control

Procurement of field and laboratory equipment and supplies is accomplished through a county-wide procurement process managed by the Clermont County Auditor's Office. The process includes the use of purchase orders and project-specific accounting codes, and is consistent with generally accepted accounting principles. The laboratory maintains control charts for all activities expected to be in statistical process control, and uses the limits established by these charts to determine if a process is not under control and in need of corrective action.

The laboratory monitors both purchased and internal solutions. The receipt and opened dates are labeled on chemicals. An expiration date and the initials of the responsible person are also printed on the chemical label. The laboratory maintains a logbook of all internal solutions, which ties each solution to its purchased chemical source. The labels of the laboratory's internal solutions include expiration date, concentration, and chemical name as well as the initials of the maker & the date made. Expired solutions are replaced immediately.

15.2 Sample Handling and Analysis

Appendix C of the Study Plan contains Standard Operating Procedures for all field activities associated with OEQ's Water Quality Monitoring Program, including an SOP for the manual collection of stream water samples. Also, Table 7, located in Section 4.2 of this document, provides information on container type, preservation, and holding times for each parameter according to the referenced method. Appendix B includes the Standard Operating Procedure for Sample Handling used by the Clermont County Sewer Lab.

Attachment 1
Annual Laboratory Inventory (last completed December, 2012)

ITEM DESCRIPTION	QUANT	SERIAL NO.	PURCHASI	PURCHASI	CURRENT V
DELL OPTIPLEX COMPUTER, GC520--JB	1	ISD 0000006875			$217.00
DELL OPTIPLEX COMPUTER, GC520--IWPT - KS	1	ISD 0000006880			$217.00
DELL OPTIPLEX COMPUTER, GC520--EH	1	ISD 0000006864			$217.00
DELL OPTIPLEX COMPUTER, GC520--PW	1	ISD 0000007458			$217.00
DELL OPTIPLEX COMPUTER, GC520 SR	1	ISD 0000007481			
DELL OPTIPLEX COMPUTER, GC270--BOD	1	ISD 0000005236			$217.00
DELL MONITOR	1	ISD 0000004539			$40.00
HP JET DIRECT 300X	1	5613145205			$98.00
FAX, SHARP FO-4400	1	47113841	4/29/04	$874.00	$874.00
MONITOR, VIEWSONIC VE510b	1	P1H042000206			$389.95
PRINTER, HP LASERJET 5P	1	ISD 0000000604	4/28/97	$245.00	
PRINTER, HP DESKJET 5550	1	ISD 0000002803			
PRINTER, HP LASERJET 5SI	1	ISD 0000003892			$398.00
PRINTER, HP DESKJET 3300	1	ISD 0000005120			
PRINTER, HP DESKJET 3300	1	ISD 0000006520			
PRINTER, SCANNER DELL 2335DN	1	ISD 0000007567			
MONITOR, DELL FLAT PANEL	1	ISD 0000004506			
MONITOR, DELL FLAT PANEL	1	ISD 0000005001			
FILTER, HVAC, 16" x 25" x 1"	6			$22.50	
FILTER, HVAC, 16" x 25" x 2"	8			$32.64	
FILTER, HVAC, 20" x 25" x 2"	8			$38.24	
FILTER, HVAC, 20" x 20" x 2"	0				
ANSWERING MACHINE, ATIVA	1		11/16/07	$44.99	
AUTOPIPET, .1 TO 1.0 ML, CLAY ADAMS	3	21195	pre 1993		
AUTOPIPET, 1 TO 5 ML, OXFORD	8	21195	pre 1993		
AUTOPIPET, 10 UL, EPPENDORF	2		pre 1993		
AUTOPIPET, 100 UL, EPPENDORF	2		pre 1993		
AUTOPIPET, 1000 UL, EPPENDORF	1	24471651	3/22/99	$198.00	
AUTOPIPET, 1000 UL, EPPENDORF	3				
AUTOPIPET, 1000-1500 UL, OXFORD	2				
AUTOPIPET, 20 UL, OXFORD	2		pre 1993		
AUTOPIPET, 200 UL, EPPENDORF	1	2127820	pre 1993		
AUTOPIPET, 5-10 ML, OXFORD	4				
AUTOPIPET, 50 UL, EPPENDORF	1				
AUTOPIPET, 500 UL, EPPENDORF	3				
BALANCE, TOPLOADER, FISHER, SC-2000	1	F38129			
BALANCE, TOPLOADER, METLER PM4600	1				
BALANCE, POSTAL PELOUZE Y50	1				$10.00
BALANCE, ANALYTICAL, AND GR-200	1		1/1/07	$2,580.00	
BALANCE, ANALYTICAL METTLER 35AR	1	376172	3/1/78		$200.00
BALANCE, TRIPLE BEAM OHAUS CENTOGRAM	1		pre 1993		$10.00
BEAKER, GLASS, 100 ML	25				
BEAKER, GLASS, 150 ML	41				
BEAKER, GLASS, 50 ML	30				
BEAKER, GLASS, 1 L	11				
BEAKER, GLASS, 2 L	5				
BEAKER, GLASS, 250 ML	20				

ITEM DESCRIPTION	QUANT	SERIAL NO.	PURCHAS	PURCHAS	CURRENT V
BEAKER, GLASS, 20 ML	8				
BEAKER, GLASS, 400 ML	10				
BEAKER, GLASS, 600 ML	7				
BEAKER, PLASTIC, 1 L	5				
BEAKER, PLASTIC, 1 L	1		1/1/07	$10.45	
BEAKER, PLASTIC, 100 ML	7				
BEAKER, PLASTIC, 120 ML	1				
BEAKER, PLASTIC, 15 ML	45				
BEAKER, PLASTIC, 150 ML	38				
BEAKER, PLASTIC, 250 ML	2				
BEAKER, PLASTIC, 30 ML	19				
BEAKER, PLASTIC, 50 ML	90				
BEAKER, PLASTIC, 500 ML	1				
BEAKER, STAINLESS, 1 L	1				
BEAKER, STAINLESS, 200 ML	2				
BK, BERGEY'S MAN. OF DETERMINATIVE BACTERIOLOGY	1				
BK, CHEMICAL HEALTH/SAFETY	1				
BK, CRC HANDBK OF CHEM AND PHYS	1				
BK, CONTROL OF PATHOGENS... SEWAGE SLUDGE, 2003	1				
BK, DICTIONARY, MSDS SHEETS	19				
BK, EPA GUIDANCE MANUAL PRETREATMENT, 1987	1				
BK, HANDBK OF ELECTRODE TECHNOLOGY	1				
BK, HANDBK OF ENV. ANALYSIS	1				
BK, HAZARDOUS CHEMICALS INFO. & DISPOSAL GUIDE, 3RD	1				
BK, ICP, ANALYTICAL ATOMIC SPECTROMETRY	1				
BK, LAB ORGANIZATION AND MANAGEMENT	1				
BK, LANGE'S HANDBK OF CHEM	1				
BK, MERCK INDEX, 10TH EDITION	1				
BK, QUALITY ASSURANCE OF CHEM MEASUREMENT	1				
BK, RECOMMENDED PRACTICES FOR HAZ. CHEMICALS.	1				
BK, ROGET'S II THE NEW THESAURUS	1				
BK, STANDARD METHODS, 15TH EDITION	2				
BK, STANDARD METHODS, 16TH EDITION	1				
BK, STANDARD METHODS, 17TH EDITION	2				
BK, STANDARD METHODS, 18TH EDITION	1				
BK, STANDARD METHODS, 20TH EDITION	1				
BK, STANDARD METHODS, 22ND EDITION	1				
BK, STATISTICS, THE EASY WAY, 2ND ED	1				
BK, TEST METHODS FOR …SOLID WASTE, SW846	1				
BK, U.S. PHARMACOPEIA NATIONAL FORMULARY, 1995	1				
BK, WASTEWATER BIOLOGY, LIFE PROCESSES	1				
BK, WASTEWATER BIOLOGY, THE MICROLIFE	2				
BK, WASTEWATER SAMPLING FOR PROCESS & QC	1				
BK, WATER ANALYSIS HANDBK, 4TH ED.	1				
BK WEBSTER'S II NEW RIVERSIDE UNIVERSITY DICTIONARY	1				
BK, WEBSTER'S NEW COLLEGIATE DICTIONARY	1				
BKCASE, HON METAL	1			$20.00	$20.00

Attachment 1

ITEM DESCRIPTION	QUANT	SERIAL NO.	PURCHASE	PURCHASE	CURRENT V
BKSHELVES, WALNUT VENEER, 2 SHELF	1				
BOTTLE, BOD	1				
BOTTLE, EYEWASH	4				
BOTTLE, GLASS, 0.2 ML DISPENSING AMBER	2				
BOTTLE, GLASS, 1 L, ALL TYPES	18				
BOTTLE, GLASS, 150 ML, ALL TYPES	9				
CABINET, STORAGE, METAL	1		1/1/73	$150.00	
CABINET, STORAGE, METAL	2		1/1/73	$200.00	
CABINET, FIREPROOF	3				
CABINET, MAROON, 56"	10				
CABINET, MAROON, 26"	1				
CABINET, MAROON, 49"	1				
CABINET, MAROON, 68"	4				
CABINET, MAROON, 63"	1				
CABINET, SERVER	1				
CART, BASKET TYPE, BEL-ART	1		8/25/88		
CART, BASKET TYPE, BEL-ART	1		11/20/91	$345.00	
CART, BASKET TYPE, LABCONCO	1		1/1/78	$15.00	
CART, BASKET TYPE, LABCONCO	1		3/1/83	$163.54	
CART, PAN TYPE, LABCONCO	1		1/1/81	$174.00	
CART, PAN TYPE, LABCONCO	1		1/1/78	$150.00	
CART, PAN TYPE, LABCONCO	1		3/1/83	$203.00	
CART, GRAY PLASTIC	1		7/31/08	$83.90	
CART, TAN PLASTIC	3				
CENTRIFUGE, FISHER 228	1				
CHAIR, MAROON, SWIVEL	10				
CHAIR, GRAY, SWIVEL	2				
CHAIR, BLACK, SWIVEL	1			$250.00	
DESK, L-SHAPE, 3 DRAWER	7				
DESK, STRAIGHT, 3 DRAWER	1				
DESK, WOOD GRAIN, 2 DRAWER	1				
DESSICATOR, ALUMINUM AND GLASS	6				
DISHWASHER, LABCONCO 44003, STEAMWASHER	1		7/2/05	$6,650.00	
DRY BOARD, 2' x 3'	1		11/1/04	$74.22	
DRY BOARD, 3' x 4'	1				
DRY BOARD, 7" x 2"	1				
DUST PAN, Rubermaid	1				
DUST PAN, Rubermaid	1		10/2/08	$4.68	
ELECTRODE, AMMONIA, ORION	1	9512HPBN	1/1/11	$374.05	
ELECTRODE, AMMONIA, ORION	1	AX1054708	3/28/96	$690.00	
ELECTRODE, DO, YSI 5010	1	06B1873			
ELECTRODE, DO, YSI 5010	1	07F100451	1/1/07	$526.50	
ELECTRODE, BOD YSI 5739 FIELD	1	5.59831E+11	11/10/98	$553.88	
ELECTRODE, PH, ROSS 815500	1		3/29/07	$281.83	
ELECTRODE, PH FOR FIELD METER, CORNING	1	3213	11/13/89	$61.00	
ELECTRODE ARM, ORION	5				
ENGRAVER, VIBROGRAVER, BURGESS	1				
EXTENSION CORD, HEAVY DUTY, 25 FT	2				

ITEM DESCRIPTION	QUANT	SERIAL NO.	PURCHASI	PURCHASI	CURRENT V
EXTINGUISHER, ANSUL SENTRY	1				
EXTINGUISHER, J.J. COSMIC	6				
EXTINGUISHER, SMALL IN HOOD	1				
EXTINGUISHER, ABC FIRE, AMEREX, LARGE	2	CR066887	1/1/90	$65.00	
EXTINGUISHER, ABC FIRE, AMEREX, SMALL	2				
HAND TRUCK, METAL, CONVERTIBLE	2				
HOTPLATE, CORNING PC35	1	H11521	10/27/80	$100.00	
HOTPLATE, CORNING PC100	1				
HOTPLATE, CORNING PC600	1		7/14/98	$235.28	
HOTPLATE, LINDBERG/BLUE M	1	919145	9/12/91	$439.00	
ICE MAKER, MANITOWOC	1		8/3/98	$2,415.00	
INCUBATOR, PRECISION, 815	2				
INCUBATOR, Heratherm (35.0 C)	1	8909439	5/1/12	$3,300.00	
INCUBATOR, GALLENKAMP	1	SG92/10/221			
MANIFOLD, 6PL, SS	1	G1300	11/6/97	$1,075.00	
MATS, FATIGUE, 3' x 3'	2		11/15/04	$39.94	
MATS, FATIGUE					
MATS, FATIGUE	4				
MATS, FATIGUE, 3" x 5'	2		11/15/04	$283.58	
MEASURING TAPE, LUFKIN, 10'	1			$9.10	
MERCURY COLLECTOR	1				
METER, HACH SENSION2 NH3	1		7/2/05	$750.00	
MICROMETER, RETICLE DISC	1				
MICROSCOPE, AMERICAN OPTICAL	1	1037	1/1/79	$1,222.00	
MICROSCOPE, NOVA VISION	1	939560132	11/28/94	$1,467.00	
MUFFLE FURNACE, THERMOLYNE, KARGE	1	8508490	12/1/81	$863.00	
NEEDLE, INOCULATING, METAL	2				
OVEN, MICROWAVE, GE, KITCHEN	1				
OVEN, DRYING	1				
OVEN, DRYING, FISHER, MODEL 750F	1	50900139	9/27/95	$1,002.00	
OVEN, DRYING, GALLENKAMP	1	SG9212425	4/1/93	$1,184.00	
PIPET, WASHER, RINSER	2	7792H64		$147.00	
PIPETS, 1 ML, GRADUATED	9				
PIPETS, 1 ML, UNGRADUATED	31				
PIPETS, 1.1 ML	66				
PIPETS, 5 ML, GRADUATED	11				
PIPETS, MOHR, 1 ML	2				
PIPETS, MOHR, 10 ML, GRADUATED	62				
PIPETS, MOHR, 10 ML, UNGRADUATED	46				
PIPETS, MOHR, 100 ML, GRADUATED	1				
PIPETS, MOHR, 2 ML, GRADUATED	4				
PIPETS, MOHR, 25 ML, GRADUATED	54				
PIPETS, MOHR, 5 ML, GRADUATED	7				
PIPETS, VOLUMETRIC, .25 ML	4				
PIPETS, VOLUMETRIC, .5 ML	8				
PIPETS, VOLUMETRIC, 1 ML	32				
PIPETS, VOLUMETRIC, 10 ML	28	136502L		$3.00	
PIPETS, VOLUMETRIC, 100 ML	14				

Attachment 1

ITEM DESCRIPTION	QUANT	SERIAL NO.	PURCHASI	PURCHASI	CURRENT V
PIPETS, VOLUMETRIC, 15 ML	5	126502M	1/1/07	$133.00	
PIPETS, VOLUMETRIC, 2 ML	38	136502C		$3.00	
PIPETS, VOLUMETRIC, 20 ML	21				
PIPETS, VOLUMETRIC, 25 ML	17				
PIPETS, VOLUMETRIC, 3 ML	17	136502D	4/26/99	$59.54	
PIPETS, VOLUMETRIC, 30 ML	17				
PIPETS, VOLUMETRIC, 4 ML	14				
PIPETS, VOLUMETRIC, 40 ML	4				
PIPETS, VOLUMETRIC, 5 ML	26			$3.00	
PIPETS, VOLUMETRIC, 50 ML	8				
PIPETS, VOLUMETRIC, 6 ML	13	136402G		$3.00	
PIPETS, VOLUMETRIC, 7 ML	17	136502H		$3.00	
PIPETS, VOLUMETRIC, 8 ML	11	136502J		$3.00	
PIPETS, VOLUMETRIC, 9 ML	22	136502K		$3.00	
PUMP, MANOSTAT VARISTALTIC	3			$600.00	
PUMP, VACUUM, SARGENT WELCH	1	1405B01	1/1/81	$701.00	
PUMP, VACUUM, SARGENT WELCH WITH TANK	1	68962	12/1/78	$900.00	
PUMP, VACUUM, GAST 0211-V45F-G8CX	2				
PUMP, VACUUM,WELCH 2225B-01	1		3/17/05	$387.41	
RACK, AUTOSAMPLER	2	3170002		$68.00	
REFRIGERATOR, CRYOFRIDGE - REVCO	1	WZ24862E	9/25/90	$1,647.38	
REFRIGERATOR, EQUATHERM	1	694001	7/12/94	$1,980.38	
REFRIGERATOR, ISOTEMP	1	86K00232	1/8/87	$1,595.00	
REFRIGERATOR, MAGIC CHEF	1	MCBR17OB	4/15/05	$69.99	
REFRIGERATOR, GE, KITCHEN	1				
REFRIGERATOR, RAETONE	1	E813R65	10/15/81	$1,970.00	
SHED, PLASTIC, RUBBERMAID	1		4/15/05	$198.00	
SHED, WOOD, 10' x 12"	1				
SHOPVAC, CRAFTSMAN, 8 GALLON	1				
SHOPVAC, CRAFTSMAN, 16 GALLON	1				
SHREDDER, PAPER, FELLOWES 110	1				
SOFTWARE - GOOD LAB PRACTICES	1		6/28/95	$425.00	
SPECTROPHOTOMETER, VISIBLE LIGHT, HACH	1				
STREAMS, ARTIFICAL	8				
STEPSTOOL, RUBBERMAID	2				
STILL, Millipore ELIX 5UV	1		1/28/13	$5,000.00	
STIR PLATE, THERMOLYNE S46415	5				
STIRPLATE, LIGHTED, THERMOLYNE 7200	2				
STIRPLATE, CIMAREC HOTSTIR SP131325	1		8/20/07	$345.60	
STIRPLATE, FISHER 220T	1				
STIRPLATE, FISHER FLAT	1		7/2/05	$300.00	
STIRPLATE, LIGHTED, VUEMIX	1				
STIRPLATE, FISHER, ROUND	1				
STIRPLATE, CORNING PC-353	1				
STOOL, LAB, PARCHMENT, CASTERS, ETC.	1		7/10/91	$250.00	
STOOL, LAB, PARCHMENT, CASTERS, ETC.	1		3/9/92	$256.00	
STOOL, LAB, PARCHMENT, CASTERS, ETC.	5		4/2/93	$1,035.00	
STORAGE BOXES, MICROSCOPE SLIDES	2				

ITEM DESCRIPTION	QUANT	SERIAL NO.	PURCHAS	PURCHAS	CURRENT V	COMMENTS
SYRINGE, STYLEX, 5CC	31					
TABLE, IN BACT ON THE WALL	1					
TABLE, 24" X 24"	1					
TABLE, 7' X 4'	2					
TABLE, MARBLE	2		1/1/73	$320.00		
TABLE, PICNIC, WOOD	1					
TELEPHONES, PARTNER 18	11					
TELEPHONES, PARTNER 18O	1					
THERMOMETER, AUTOCLAVE	2		3/23/07	$58.96		
THERMOMETER, DIAL	4					
TOOL: SCREWDRIVER SET, PRECISION	1		5/12/08	$12.05		
TOOL: NUT DRIVER, 5/16"	1		3/7/07	$3.25		
TOOL: VARIOUS	50				$200.00	
WATERBATH, NATIONAL 210	1					
WATERBATH, BLUE M MAGNI WHIRL	1					
IDEXX Sealer	1		5/28/13	$4,000.00		
UV light	1		5/24/13	$400.00		